UL 60691

STANDARD FOR SAFETY

Thermal-Links – Requirements and Application Guide

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UL Standard for Safety for Thermal-Links – Requirements and Application Guide, UL 60691

Fifth Edition, Dated December 27, 2024

Summary of Topics

Adoption of the Fifth Edition of IEC 60691, Standard for Thermal-Links – Requirements and Application Guide as the Fifth Edition of ANSI/UL 60691, dated December 27, 2024.

UL 60691 is an adoption of IEC 60691, Fifth Edition issued by the IEC March 2023. Please note that the National Difference document incorporates the U.S. national differences for UL 60691 which are not included as part of the IEC standard.

The new requirements are substantially in accordance with Proposal(s) on this subject dated June 28, 2024.

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Electronic Components Industry Association
EIA 60691
Fifth Edition



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UL 60691
Fifth Edition

Standard for Thermal-Links – Requirements and Application Guide

December 27, 2024



ANSI/UL 60691-2024

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This ANSI/UL Standard for Safety consists of the Fifth Edition.

The most recent designation of ANSI/UL 60691 as an American National Standard (ANSI) occurred on December 27, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

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CONTENTS

Preface **5**

NATIONAL DIFFERENCES **7**

FOREWORD **9**

INTRODUCTION **11**

1 Scope 13
1DV Modification of the fifth paragraph to add the following: 13
2 Normative references 13
2DV Modification of Clause 2 to add the following: 14
3 Terms and definitions 14
4 General requirements 16
5 General notes on tests 17
6 Classification 19
6.1 Electrical conditions 19
6.2 Thermal conditions 20
6.3 Resistance to tracking 20
7 Marking 20
8 Documentation 21
9 Constructional requirements 21
9.1 General 21
9.2 Lead secureness tests 23
9.3 Contacts used for the current path 25
9.4 Accessible mounting brackets or metal parts 25
9.5 Insulating materials 25
9.6 Resistance to tracking 25
9.6.2DV Modification to add the following: 25
9.7 Creepage distances and clearances 26
9.8 Temperature and humidity cycle conditioning 26
9.9 Terminals and terminations 27
10 Electrical requirements 27
10.1 Dielectric strength 27
10.2 Insulation resistance 28
10.3 Interrupting current 28
10.4 Transient overload current 30
10.5 Limited short-circuit test 30
11 Temperature tests 32
11.1 General 32
11.2 Holding temperature, T_h 33
11.3 Rated functioning temperature, T_f 33
11.4 Maximum temperature limit, T_m 33
11.5 Ageing 33
12 Resistance to rusting 34
13 Manufacturer’s validation programme 34

Annex A (normative) Application guide

Annex B (normative) Alternative ageing test for thermal-links with T^h greater than 250 °C for use in electric irons

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Annex C (normative) Conductive heat ageing test

C.1 Conductive heat ageing test....38
C.2 Method....38
C.2.1 General....38
C.2.2 Typical test fixture assembly....38
C.2.3 Temperature setting....38
C.2.4 Temperature behaviour....38
C.2.5 Temperature monitoring....39
C.3 Ageing....39
C.3.1 General....39
C.3.2 Cooling operation....39
C.3.3 Premature operation....39
C.4 Results....40
C.5 Dielectric strength test....40
C.6 Test oven....40

Annex D (informative) Extended holding temperature evaluation

D.1 Extended holding temperature conditioning test....42
D.2 Load current interrupt test....42

Annex E (normative) Seal ageing test

Annex F (normative) Identification requirements

Annex G (normative) Indelibility of markings[1]

Annex H (normative) Requirements for thermal-link packaged assemblies

H.3 Terms and definitions....48
H.4 General requirements....48
H.5 General notes on tests....48
H.6 Classification....48
H.6.2 Thermal conditions....48
H.8 Documentation....48
H.9 Constructional requirements....48
H.9.5 Insulating materials....49
H.9.9 Terminals and terminations....49
H.11.101 Maximum use temperature test....50

Annex I (informative) Holding temperature

Bibliography

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Preface

This is the harmonized EIA and ULSE standard for Standard for Thermal-Links – Requirements and Application Guide. It is the fifth edition of EIA 60691, and the fifth edition of UL 60691. This edition of EIA 60691 supersedes the previous edition published June 30, 2016. This edition of UL 60691 supersedes the previous edition(s) published on June 30, 2016.

This harmonized standard is based on IEC Publication 60691: edition 5.0, Thermal-links – Requirements and application guide issued March 2023. IEC publication 60691 is copyrighted by the IEC.

This harmonized standard was prepared by EIA and UL Standards & Engagement (ULSE).

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard adopts the IEC text with national differences. This standard is published as an equivalent standard for EIA and ULSE. An equivalent standard is a standard that is substantially the same in technical content, except as follows:

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All national differences from the IEC text are included in the EIA and ULSE versions of the standard. While the technical content is the same in each organization's version, the format and presentation may differ.

Reasons for Differences From IEC

Differences from the IEC are being added in order to address safety and regulatory situations present in the US.

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The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

THERMAL-LINKS – REQUIREMENTS AND APPLICATION GUIDE

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IEC 60691 has been prepared by subcommittee 32C: Miniature fuses, of IEC technical committee 32: Fuses. It is an International Standard.

This fifth edition cancels and replaces the fourth edition published in 2015 and Amendment 1:2019. This edition constitutes a technical revision.

This fifth edition includes the following significant technical changes with respect to the previous edition:

a) requirements for thermal-link packaged assemblies;

b) renew the requirements and definitions for T_h-test;

The harmonization of the USA national standard, UL 1020, fifth edition (withdrawn 2003), and IEC 60691:1993, together with its Amendment 1:1995 and Amendment 2:2000 have served as a basis for the elaboration of this standard

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The text of this International Standard is based on the following documents:

Draft	Report on voting
32C/604/FDIS	32C/605/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The following differing practices of a less permanent nature exist in the country indicated below:

– Annex C is required to be declared in the USA;

– Annex E is required in the USA, if applicable;

– Annex F is required to be declared in the USA.

In this standard, the following type is used:

– *compliance statements: in italic type.*

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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INTRODUCTION

Thermal-links, defined as non-resettable devices functioning once only without refunctioning, are widely applied for the thermal protection of equipment in which, under fault (abnormal) conditions, one or more parts may reach hazardous temperatures.

As these devices have several aspects in common with miniature fuse-links and are used for obtaining a comparable degree of protection, this standard has endeavoured to lay down a number of basic requirements for such devices.

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THERMAL-LINKS – REQUIREMENTS AND APPLICATION GUIDE

1 Scope

This International Standard is applicable to thermal-links intended for incorporation in electrical appliances, electronic equipment and component parts thereof, normally intended for use indoors, in order to protect them against excessive temperatures under abnormal conditions.

NOTE 1 The equipment is not designed to generate heat.

NOTE 2 The effectiveness of the protection against excessive temperatures logically depends upon the position and method of mounting of the thermal-link, as well as upon the current which it is carrying.

This document may be applicable to thermal-links for use under conditions other than indoors, provided that the climatic and other circumstances in the immediate surroundings of such thermal-links are comparable with those in this standard.

This document may be applicable to thermal-links in their simplest forms (e.g. melting strips or wires), provided that molten materials expelled during function cannot adversely interfere with the safe use of the equipment, especially in the case of hand-held or portable equipment, irrespective of its position.

Annex H of this document is applicable to thermal-link packaged assemblies where the thermal-link(s) has already been approved to this standard but packaged in a metallic or non-metallic housing and provided with terminals/wiring leads.

This document is applicable to thermal-links with a rated voltage not exceeding 690 V AC or DC and a rated current not exceeding 63 A.

1DV DR *Modification of the fifth paragraph to add the following:*

The maximum current is unlimited.

The objectives of this document are:

a) to establish uniform requirements for thermal-links,

b) to define methods of test, and

c) to provide useful information for the application of thermal-links in equipment.

This document is not applicable to thermal-links used under extreme conditions such as corrosive or explosive atmospheres.

This document is not applicable to thermal-links to be used in circuits on AC with a frequency lower than 45 Hz or higher than 62 Hz.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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IEC 60065:2014, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60112:2020, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60127-2:2014, *Miniature fuses – Part 2: Cartridge fuse-links*

IEC 60216-5:2008, *Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative thermal endurance index (RTE) of an insulating material*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60695-2-12:2021, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60695-2-13:2021, *Fire hazard testing – Part 2-13: Glowing/hot-wire based test methods – Glow-wire ignition temperature (GWIT) test method for materials*

IEC 60695-10-2:2014, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60730-1:2013, *Automatic electrical controls – Part 1: General requirements*
IEC 60730-1:2013/AMD1:2015
IEC 60730-1:2013/AMD2:2020

IEC 61210:2010, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

2DV DC *Modification of Clause 2 to add the following:*

UL 94, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 746A, *Polymeric Materials – Short Term Property Evaluations*

UL 746B, *Polymeric Materials – Long Term Property Evaluations*

UL 746C, *Polymeric Materials – Use in Electrical Equipment Evaluations*

UL 746D, *Polymeric Materials – Fabricated Parts*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

• IEC Electropedia: available at http://www.electropedia.org/

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